WHAT IS CLAIMED IS:

1. A subterranean well sensor system, comprising:

a structure in which strain is induced in response to a pressure differential in the well; and

first and second strain sensors attached to the structure and detecting strain in the structure when the pressure differential exists in the well, the first strain sensor detecting a first strain in a first direction in the structure, and the second strain sensor detecting a second strain in a second direction in the structure.

2. The sensor system according to Claim 1, wherein a predetermined mathematical relationship exists between the pressure differential, the first strain and the second strain.

3. The sensor system according to Claim 1, wherein strain is induced in the structure in response to a change in temperature in the well, and wherein at least one of the first and second strains includes strain induced in the structure due to the temperature change.

4. The sensor system according to Claim 3, wherein each of the first and second strains includes strain induced in the structure due to the temperature change.

5. The sensor system according to Claim 1, wherein each of the first and second strains includes strain induced in the structure due to the pressure differential.

6. The sensor system according to Claim 1, wherein only one of the first and second strains includes strain induced in the structure due to the pressure differential.

7. The sensor system according to Claim 1, wherein the structure includes a hollow cylinder, and wherein the first strain sensor detects axial strain in the cylinder and the second strain sensor detects hoop strain in the cylinder induced by the pressure differential.

8. The sensor system according to Claim 7, wherein the first and second strain sensors are each centered at approximately a same longitudinal position on the cylinder, and the first and second sensors are radially offset with respect to each other by approximately 180°.

9. The sensor system according to Claim 7, wherein each of the first and second strain sensors detects strain in the cylinder induced by a temperature change in the well.

10. The sensor system according to Claim 9, wherein each of the first and second strains includes strain induced in the cylinder by the pressure differential and by the temperature change.

11. The sensor system according to Claim 10, wherein a predetermined mathematical relationship exists between the pressure differential and the first and second strains, so that the pressure differential may be calculated when the first and second strains are known.

12. The sensor system according to Claim 7, wherein the pressure differential exists between an interior and an exterior of the cylinder.

13. The sensor system according to Claim 12, wherein well pressure is applied to the interior of the cylinder and approximately atmospheric pressure is applied to the exterior of the cylinder.

14. The sensor system according to Claim 1, wherein the structure includes a pressure responsive membrane, and wherein each of the first and second strain sensors detects strain in the membrane induced by the pressure differential.

15. The sensor system according to Claim 14, wherein each of the first and second strain sensors detects strain in the membrane induced by a temperature change in the well.

16. The sensor system according to Claim 15, wherein each of the first and second strains includes strain induced in the cylinder by the pressure differential and by the temperature change.

17. The sensor system according to Claim 16, wherein a predetermined mathematical relationship exists between the pressure differential and the first and second strains, so that the pressure differential may be calculated when the first and second strains are known.

18. The sensor system according to Claim 14, wherein the pressure differential exists between opposite sides of the membrane.

19. The sensor system according to Claim 18, wherein well pressure is applied to one side of the membrane and approximately atmospheric pressure is applied to the other side of the membrane.

20. The sensor system according to Claim 1, wherein the structure includes first and second portions, and wherein the first strain sensor detects strain in the first portion and the second strain sensor detects strain in the second portion.

21. The sensor system according to Claim 20, wherein the pressure differential induces strain in the first portion, but the pressure differential does not induce strain in the second portion.

22. The sensor system according to Claim 20, wherein each of the first and second strain sensors detects strain in the structure induced by a temperature change in the well.

23. The sensor system according to Claim 22, wherein the first strain includes strain induced in the structure by the pressure differential and by the temperature change, but the second strain does not include strain induced in the structure by the pressure differential.

24. The sensor system according to Claim 23, wherein a predetermined mathematical relationship exists between the pressure differential and the first and second strains, so that the pressure differential may be calculated when the first and second strains are known.

25. The sensor system according to Claim 20, wherein the pressure differential exists between an interior and an exterior of the structure.

26. The sensor system according to Claim 25, wherein well pressure is applied to the interior of the structure and approximately atmospheric pressure is applied to the exterior of the structure.

27. The sensor system according to Claim 1, wherein at least one of the first and second strain sensors is a fiber optic sensor.

28. The sensor system according to Claim 27, wherein the fiber optic sensor is an interferometric fiber optic sensor.

29. The sensor system according to Claim 27, wherein the fiber optic sensor comprises a fiber Bragg grating.

30. The sensor system according to Claim 27, wherein the fiber optic sensor comprises a pi-shifted fiber Bragg grating.

31. The sensor system according to Claim 27, wherein the fiber optic sensor comprises a long period grating.

32. The sensor system according to Claim 27, wherein the fiber optic sensor comprises a fiber Bragg laser.

33. The sensor system according to Claim 27, wherein the fiber optic sensor comprises a selected one of an intrinsic and extrinsic Fabry-Perot interferometer.

34. The sensor system according to Claim 27, wherein the fiber optic sensor comprises a Michelson interferometer.

35. The sensor system according to Claim 27, wherein the fiber optic sensor comprises a Mach-Zehnder interferometer.

36. The sensor system according to Claim 27, wherein the fiber optic sensor comprises a co-located fiber Bragg grating and pi-shifted fiber Bragg grating.

37. The sensor system according to Claim 27, wherein the fiber optic sensor comprises a fiber ring resonator.

38. A subterranean well sensor system, comprising:

a generally tubular structure having a pressure differential applied across its inner and outer surfaces, the pressure differential existing between well pressure applied to one of the inner and outer surfaces and a second predetermined pressure applied to the other of the inner and outer surfaces; and

first and second strain sensors, each of the first and second strain sensors detecting strain in the structure induced by the pressure differential and strain induced in the structure by a temperature change in the well, the first strain sensor detecting strain in the structure in a first direction, and the second strain sensor detecting strain in the structure in a second direction different from the first direction.

39. The sensor system according to Claim 38, wherein the structure includes a hollow cylinder, wherein the first strain sensor detects axial strain in the cylinder, and wherein the second strain sensor detects hoop strain in the cylinder.

40. The sensor system according to Claim 39, wherein the first and second strain sensors are each centered at approximately a same longitudinal position on the cylinder, and the first and second sensors are radially offset with respect to each other by approximately 180°.

41. The sensor system according to Claim 38, wherein the second predetermined pressure is contained within an annular space between the structure and an outer housing.

42. The sensor system according to Claim 41, wherein the first and second strain sensors are positioned in the annular space and are attached to the outer surface of the structure.

43. The sensor system according to Claim 38, wherein the second predetermined pressure is approximately atmospheric pressure.

44. The sensor system according to Claim 38, wherein at least one of the first and second strain sensors is a fiber optic sensor.

45. The sensor system according to Claim 44, wherein the fiber optic sensor is an interferometric fiber optic sensor.

46. The sensor system according to Claim 44, wherein the fiber optic sensor comprises a fiber Bragg grating.

47. The sensor system according to Claim 44, wherein the fiber optic sensor comprises a pi-shifted fiber Bragg grating.

48. The sensor system according to Claim 44, wherein the fiber optic sensor comprises a long period grating.

49. The sensor system according to Claim 44, wherein the fiber optic sensor comprises a fiber Bragg laser.

50. The sensor system according to Claim 44, wherein the fiber optic sensor comprises a selected one of an intrinsic and extrinsic Fabry-Perot interferometer.

51. The sensor system according to Claim 44, wherein the fiber optic sensor comprises a Michelson interferometer.

52. The sensor system according to Claim 44, wherein the fiber optic sensor comprises a Mach-Zehnder interferometer.

53. The sensor system according to Claim 44, wherein the fiber optic sensor comprises a co-located fiber Bragg grating and pi-shifted fiber Bragg grating.

54. The sensor system according to Claim 44, wherein the fiber optic sensor comprises a fiber ring resonator.

55. A subterranean well sensor system, comprising:

a structure having a pressure differential applied across a membrane of the structure, the pressure differential existing between well pressure applied to a first side of the membrane and a second predetermined pressure applied to a second side of the membrane; and

first and second strain sensors, each of the first and second strain sensors detecting strain in the membrane induced by the pressure differential and strain induced in the membrane by a temperature change in the well, the first strain sensor detecting strain in the membrane in a first direction, and the second strain sensor detecting strain in the membrane in a second direction different from the first direction.

56. The sensor system according to Claim 55, wherein the first and second directions are orthogonal to each other.

57. The sensor system according to Claim 55, wherein the first strain sensor is positioned centrally on the membrane, and wherein the second strain sensor is positioned peripherally on the membrane.

58. The sensor system according to Claim 55, wherein the second predetermined pressure is approximately atmospheric pressure.

59. The sensor system according to Claim 55, wherein at least one of the first and second strain sensors is a fiber optic sensor.

60. The sensor system according to Claim 59, wherein the fiber optic sensor is an interferometric fiber optic sensor.

61. The sensor system according to Claim 59, wherein the fiber optic sensor comprises a fiber Bragg grating.

62. The sensor system according to Claim 59, wherein the fiber optic sensor comprises a pi-shifted fiber Bragg grating.

63. The sensor system according to Claim 59, wherein the fiber optic sensor comprises a long period grating.

64. The sensor system according to Claim 59, wherein the fiber optic sensor comprises a fiber Bragg laser.

65. The sensor system according to Claim 59, wherein the fiber optic sensor comprises a selected one of an intrinsic and extrinsic Fabry-Perot interferometer.

66. The sensor system according to Claim 59, wherein the fiber optic sensor comprises a Michelson interferometer.

67. The sensor system according to Claim 59, wherein the fiber optic sensor comprises a Mach-Zehnder interferometer.

68. The sensor system according to Claim 59, wherein the fiber optic sensor comprises a co-located fiber Bragg grating and pi-shifted fiber Bragg grating.

69. The sensor system according to Claim 59, wherein the fiber optic sensor comprises a fiber ring resonator.

70. A subterranean well sensor system, comprising:

a structure having first and second portions, a pressure differential applied across the first portion, the pressure differential existing between well pressure applied to a first surface of the first portion and a second predetermined pressure applied to a second surface of the first portion; and

first and second strain sensors, each of the first and second strain sensors detecting strain in the structure induced by a temperature change in the well, the first strain sensor detecting strain in the first portion induced by the pressure differential, and the second strain sensor detecting strain in the second portion induced by the temperature change but not detecting strain in the second portion induced by the pressure differential.

71. The sensor system according to Claim 70, wherein the structure first portion is generally tubular and the structure second portion is substantially solid.

72. The sensor system according to Claim 70, wherein the second predetermined pressure is contained within an annular space between the structure and an outer housing.

73. The sensor system according to Claim 72, wherein the first and second strain sensors are positioned in the annular space.

74. The sensor system according to Claim 70, wherein the second predetermined pressure is approximately atmospheric pressure.

75. The sensor system according to Claim 70, wherein at least one of the first and second strain sensors is a fiber optic sensor.

76. The sensor system according to Claim 75, wherein the fiber optic sensor is an interferometric fiber optic sensor.

77. The sensor system according to Claim 75, wherein the fiber optic sensor comprises a fiber Bragg grating.

78. The sensor system according to Claim 75, wherein the fiber optic sensor comprises a pi-shifted fiber Bragg grating.

79. The sensor system according to Claim 75, wherein the fiber optic sensor comprises a long period grating.

80. The sensor system according to Claim 75, wherein the fiber optic sensor comprises a fiber Bragg laser.

81. The sensor system according to Claim 75, wherein the fiber optic sensor comprises a selected one of an intrinsic and extrinsic Fabry-Perot interferometer.

82. The sensor system according to Claim 75, wherein the fiber optic sensor comprises a Michelson interferometer.

83. The sensor system according to Claim 75, wherein the fiber optic sensor comprises a Mach-Zehnder interferometer.

84. The sensor system according to Claim 75, wherein the fiber optic sensor comprises a co-located fiber Bragg grating and pi-shifted fiber Bragg grating.

85. The sensor system according to Claim 75, wherein the fiber optic sensor comprises a fiber ring resonator.

86. A method of measuring pressure in a subterranean well, the method comprising the steps of:

applying a pressure differential across a structure positioned in the well;

detecting a first strain in the structure in a first direction using a first strain sensor;

detecting a second strain different from the first strain in the structure in a second direction using a second strain sensor; and

calculating the pressure differential using a predetermined mathematical relationship between the pressure differential and the first and second strains.

87. The method according to Claim 86, further comprising the step of applying a change in temperature to the structure in the well, and

wherein each of the first and second strains includes strain induced by the temperature change.

88. The method according to Claim 87, wherein each of the first and second strains includes the same strain induced by the temperature change.

89. The method according to Claim 87, wherein the calculating step further comprises subtracting strain induced by the temperature change from the first and second strains.

90. The method according to Claim 86, wherein in the first and second strain detecting steps, the first and second directions are orthogonal to each other.

91. The method according to Claim 86, wherein in the pressure differential applying step, the structure includes a generally tubular portion and

the pressure differential is applied between inner and outer surfaces of the tubular portion.

92. The method according to Claim 91, wherein in the first strain detecting step, the first strain is an axial strain in the tubular portion, and

wherein in the second strain detecting step, the second strain is a hoop strain in the tubular portion.

93. The method according to Claim 86, wherein in the pressure differential applying step, the structure includes a membrane and the pressure differential is applied between opposite sides of the membrane.

94. The method according to Claim 86, wherein in the first and second strain detecting steps, at least one of the first and second strain sensors is a fiber optic sensor.

95. A method of measuring pressure in a subterranean well, the method comprising the steps of:

applying a pressure differential across a structure positioned in the well;

applying a temperature change to the structure in the well;

detecting a first strain in the structure induced by the pressure differential and the temperature change using a first strain sensor;

detecting a second strain in the structure induced by the temperature change using a second strain sensor, the second strain sensor not detecting strain induced in the structure by the pressure differential; and

a predetermined mathematical relationship existing between the pressure differential and the first and second strains.

96. The method according to Claim 95, wherein the difference between the first and second strains is the strain in the structure induced by the pressure differential.

97. The method according to Claim 95, wherein in the first strain detecting step, the first strain sensor is attached to a generally tubular portion of the structure.

98. The method according to Claim 95, wherein in the second strain detecting step, the second strain sensor is attached to a generally solid portion of the structure.

99. The method according to Claim 98, wherein in the pressure differential applying step, the pressure differential is not applied across the solid portion of the structure.

100. A method of measuring pressure in a subterranean well, the method comprising the steps of:

applying a pressure differential across a structure positioned in the well;

applying a temperature change to the structure in the well;

detecting a first strain in the structure induced by the pressure differential and the temperature change using a first strain sensor;

detecting a second strain different from the first strain in the structure induced by the pressure differential and the temperature change using a second strain sensor; and

a predetermined mathematical relationship existing between the pressure differential and the first and second strains.

101. The method according to Claim 100, wherein each of the first and second strains includes the same strain induced by the temperature change.

102. The method according to Claim 100, wherein in the first strain detecting step, the first strain sensor is attached to a generally tubular portion of the structure.

103. The method according to Claim 102, wherein in the second strain detecting step, the second strain sensor is attached to the tubular portion of the structure.

104. The method according to Claim 103, wherein the first and second strain sensors are each centered at approximately a same longitudinal position on the tubular portion, and the first and second sensors are radially offset with respect to each other by approximately 180°.

105. The method according to Claim 103, wherein in the first and second strain detecting steps, the first strain sensor senses hoop strain in the tubular portion and the second strain sensor senses axial strain in the tubular portion.